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COOPER & DUNHAM, LLP
1185 AVENUE OF THE AMERICAS
NEW YORK, NY 10036

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CORBETT, JOHN M	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/524,341	**Applicant(s)** GOTO ET AL.	
	Examiner John M. Corbett	**Art Unit** 2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 March 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 November 2007* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because …

In Figure 14A, it is unclear to the Examiner as to the variable represented by the ordinate (N) in the diagram. Perhaps the variable "Z" was meant to be represented.

In Figure 24, box S4, "DETERMENT PHASE RANGE OF EACH PROJECTION DATA USED FOR EACH VOXEL" is indicated. Perhaps "DETERMINE PHASE RANGE OF EACH PROJECTION DATA USED FOR EACH VOXEL" was meant.

In Figure 27, box S4, "DETERMENT PHASE RANGE OF EACH PROJECTION DATA USED FOR EACH VOXEL" is indicated. Perhaps "DETERMINE PHASE RANGE OF EACH PROJECTION DATA USED FOR EACH VOXEL" was meant.

In Figure 30, box S4, "DETERMENT PHASE RANGE OF EACH PROJECTION DATA USED FOR EACH VOXEL" is indicated. Perhaps "DETERMINE PHASE RANGE OF EACH PROJECTION DATA USED FOR EACH VOXEL" was meant.

In the Applicants response filed 5 November 2007, on page 10, lines 3-4 of the **Amendments to the Drawings**, the Applicant stated that "Figures 15A, 16 and 30 are now labeled as prior art" which they are not. The Applicant is required to supply new drawing for

Figures 15A, 16 and 30 clearly labeled as "prior art" or clarify the record as to status of the figures.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claim 13 is objected to because of the following informalities, which appear to be minor draft errors including grammatical and/or lack of antecedent basis problems.

In the following format (location of objection; suggestion for correction), the following correction(s) may obviate the objection(s):

(Claim 13, line 2, "projection phase range capable" was claimed, perhaps "projection phase range" was meant).

Appropriate correction is required.

Specification

3. The disclosure is objected to because of the following informalities, which appear to be minor draft errors including grammatical problems.

In the following format (location of objection; suggestion for correction), the following correction(s) may obviate the objection(s):

(Page 2, lines 8-9; "SID denotes a distance between the X-ray tube and CT device" was recited, perhaps "SID denotes a distance between the X-ray tube and detector" was meant).

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-14 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not

described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

With respect to claims 1 and 10, the invention as now claimed requires “an optional angle”. The specification as originally filed does not describe an optional angle. Accordingly, the invention as now claimed is not supported by the specification. This is a new matter rejection. Claims 2-9 and 11-14 are rejected for the above reasons by virtue of their dependency.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 1 and 10, the phrase "optional angle" is unclear insofar as the meaning is not understood. Therefore the claims are rejected for being indefinite. Claims 2-9 and 11-14 are rejected by virtue of their dependency.

With respect to claims 5, 6 and 7, the limitation “polygonal display pixel” is unclear insofar as the meaning is not understood. Therefore the claims are rejected for being indefinite. Claims 8 and 9 are rejected by virtue of their dependency.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-3 are rejected, as best understood, under 35 U.S.C. 103(a) as being unpatentable over Noo et al. ("Single-slice rebinning method for helical cone-bean CT", 1999, Phys. Med. Biol., Vol. 44, pages 561-570) in view of Avila et al. (6,947,584) and Tuy (6,097,784).

With respect to claim 1, Noo et al. discloses an apparatus comprising:

a radiation source and a radiation detector arranged opposite to each other (Figure 1), between which a bed with an examinee placed thereon is provided (Page 562, line 11), said radiation source and radiation detector turning around said bed which can be moved with respect to this go-around axis (Page 562, line 11), radiation irradiated from said radiation source and passing through the examinee being detected using said radiation detector (Figure 1); and

reconfiguration means (Page 566, line 33) for creating a tomographic image in a region in concern of the object from the detected projection data, said reconfiguration means

determines, for each voxel, a projection data phase range as an optional angle of 180 degrees or more (Page 564, lines 6-7 and Figure 3a),

superimposes a reconfiguration filter (Page 565, line 16),

assigns weights to data of the same phase or opposite phase for each phase for this projection data phase range (Page 565, lines 14-15) and

back projects this filter-processed projection data over said projection data phase range determined for each voxel along the irradiation trace of the radiation beam (Page 565, lines 16-18).

Noo et al. fails to explicitly disclose creating a three-dimension back tomographic image. Noo et al. further fails to disclose three-dimension back projects.

Avila et al. teaches creating a three-dimensional tomographic image (Col. 4, lines 40-52).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Noo et al. to include the three-dimensional tomographic imaging of Avila et al., since a person would have been motivated to make such a modification for conveying more information to the operator (Col. 1, lines 35-39) as taught by Avila et al.

Tuy teaches three-dimension back projects (Abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the apparatus of Noo et al. as modified above the three-dimensional back projects of Tuy, since a person would have been motivated to make such a modification to improve imaging by achieving high-quality images (Col. 3, lines 21-22) as taught by Tuy.

With respect to claim 2, Noo et al. further teaches when determining said projection data phase range, projection data phase range is necessarily determined so that the difference in the absolute values of cone angles at both ends of the projection phase data range used is reduced (Page 564, lines 1-2 and Figure 3a).

With respect to claim 3, Noo et al. further teaches the projection data phase range used is determined so as to be the same phase range for each voxel (Page 563, lines 30-32, Page 564, lines 1-2 and Figure 3a).

7. Claims 1 and 4-5 are rejected, as best understood, under 35 U.S.C. 103(a) as being unpatentable over Hsieh (20030073893) in view of Avila et al.

With respect to claim 1, Hsieh ('893) discloses an apparatus comprising:

a radiation source (12) and a radiation detector (20) arranged opposite to each other (Figure 3), between which a bed (39) with an examinee (18) placed thereon is provided, said radiation source and radiation detector turning around said bed (Figure 3) which can be moved (37) with respect to this go-around axis, radiation irradiated from said radiation source and passing through the examinee being detected using said radiation detector (Paragraph 23); and

reconfiguration means (40) for creating an image in a region in concern of the object from the detected projection data (74), said reconfiguration means

determines, for each voxel, a projection data phase range as an optional angle of 180 degrees or more (Paragraph 27),

superimposes a reconfiguration filter (Paragraph 28),

assigns weights to data of the same phase or opposite phase for each phase for this projection data phase range (Paragraph 28) and

three-dimension back projects this filter-processed projection data over said projection data phase range determined for each voxel along the irradiation trace of the radiation beam (Paragraph 28).

Hsieh ('893) fails to explicitly disclose creating a three-dimensional tomographic image.

Avila et al. teaches creating a three-dimensional tomographic image (Col. 4, lines 40-52).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Hsieh ('893) to include the three-dimensional tomographic imaging of Avila et al., since a person would have been motivated to make such a modification for conveying more information to the operator (Col. 1, lines 35-39) as taught by Avila et al.

With respect to claim 4, Hsieh ('893) further teaches said projection data phase range is either 270 degrees or 360 degrees (Paragraph 32).

With respect to claim 5, Hsieh ('893) further teaches projection data whose number of images taken per rotation is a multiple of the number of sides C of a polygonal display pixel is acquired (Paragraphs 23 and 26, images taken), and

said reconfiguration means comprises

back projection means (40) for superimposing said reconfiguration filter on this projection data,

grouping data at the same channel position and having projection phases in the go-around direction shifting by $2N\pi/C$ (N=1, 2, 3, ...) radians at a time (Paragraph 27) and

performing back projection to a square image array group by group (Paragraphs 27-28).

8. Claim 6 is rejected, as best understood, under 35 U.S.C. 103(a) as being unpatentable over Hsieh ('893) in view of Avila et al. as applied to claim 1 above, and further in view of Hsieh (6,490,333).

With respect to claim 6, Hsieh ('893) as modified above suggests the apparatus as recited above. Hsieh ('893) further teaches said reconfiguration means

obtains the projection data whose number of images taken per rotation is a multiple of the number of sides C of a polygonal display pixel (Paragraphs 23 and 26, data obtained),

superimposes the filter on this projection data (Paragraph 28),

groups data at the same channel position and having projection phases in the go-around direction shifting by $2N\pi/C$ (N=1, 2, 3, ...) radians at a time (Paragraph 27) and

performs back projection to a square image array group by group (Paragraphs 27-28).

Hsieh ('893) fails to teach converts the projection data obtained to data including fan beam data and parallel beam data.

Hsieh ('333) teaches converts the projection data obtained to data including fan beam data and parallel beam data (Col. 2, lines 29-32).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the apparatus of Hsieh ('893) as modified above the converting of Hsieh ('333), since a person would have been motivated to make such a modification to improve the

reconstruction process by simplifying the computations (Col. 6, lines 10-11) as taught by Hsieh ('333).

9. Claims 10-12 and 14 are rejected, as best understood, under 35 U.S.C. 103(a) as being unpatentable over Flohr et al. (5,796,803) in view of Silver (5,889,833), Bruder et al. ("Single-Slice Rebinning Reconstruction in Spiral Cone-Beam Computed Tomography", IEEE Transactions on Medical Imaging, September 2000, Vol. 19, No. 9, Pages 873-887) and Tuy (6,097,784).

With respect to claim 10, Flohr et al. discloses an apparatus comprising:

a radiation source (9) and a radiation detector (2) made up of two-dimensionally arranged detection elements (Figure 1), arranged opposite to each other (Figure 1), between which a bed with an examinee placed thereon is provided (Col. 2, lines 41-42), said radiation source and radiation detector turning around said bed which can be moved with respect to this go-around axis (Col. 1, lines 57-59), radiation irradiated from said radiation source and passing through said examinee being detected using said radiation detector (Col. 2, lines 44-45); and

reconfiguration means (7) for creating a three-dimensional tomographic image in said region in concern of the examinee from the detected projection data, said reconfiguration means

calculates an approximation for a curve obtained by projecting a spiral trace of an X-ray source with respect to said examinee onto a plane parallel to said go-around axis (Col. 5, lines 15-53),

corrects each row of the projection data by multiplying a coefficient which is dependent on the angle of inclination of radiation from said radiation source (Col. 5, line 53 – Col. 6, line 28), and

carries out one-dimensional rearrangement processing for obtaining parallel beam projection data from the fan beam projection data obtained from a fan-shaped fan beam viewed from the go-around axis direction generated from said radiation source (Col. 1, lines 64-66).

Flohr et al. fails to explicitly disclose a reconstruction means creating a three-dimensional image and said reconstruction means determines, for each voxel, a projection data phase range as an optional angle of 180 degrees or more.

Flohr et al. fails to disclose said reconfiguration means

calculates a straight line,

superimposes said reconfiguration filter on said parallel projection data to generate filter-processed parallel projection data, and

three-dimension back projects the parallel beam projection data subjected to said filter processing based on said projection data phase range determined for each voxel to the back projection region corresponding to said region in concern along the approximate irradiation trace using said approximation.

Silver teaches determines, for each voxel, a projection data phase range as an optional angle of 180 degrees or more (Items 32 and 34).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Flohr et al. to include the determining of Silver, since a

person would have been motivated to make such a modification to improve imaging by shortening scan times while maintaining image quality (Col. 1, lines 53-55) as taught by Silver.

Bruder et al. teaches said reconfiguration means

calculates a straight line (Page 876, Col. 1, lines 14-20, i.e. plane of tilted slice),

superimposes said reconfiguration filter on said parallel projection data to generate filter-processed parallel projection data (Page 874, Col. 1, lines 32-37), and

back projects the parallel beam projection data subjected to said filter processing based on said projection data phase range (Page 874, Col. 1, lines 20-22) determined for each voxel to the back projection region corresponding to said region in concern along the approximate irradiation trace using said approximation.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the apparatus of Flohr et al. as modified above the line and filtered backprojection of Bruder et al., since a person would have been motivated to make such a modification to improve imaging by improving computational efficiency (Page 873, Col. 2, lines 41-42) as implied by Bruder et al.

Tuy teaches a reconstruction means creating a three-dimensional image (Col. 1, lines 18-19 and Col. 4, lines 48-49) and three-dimension back projects (Col. 4, lines 48-49).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the apparatus of Flohr et al. as modified above the three-dimension back projecting of Tuy, since a person would have been motivated to make such a modification to improve imaging by improving image quality (Col. 3, lines 21-23) as implied by Tuy.

With respect to claim 11, Bruder et al. further teaches said reconfiguration means performs redundancy (Page 874, Col. 1, lines 7-9) correction weighting for generating a weighting factor from a weighting function in the phase direction (Sections IIA and IIB, Pages 874-877) to correct data redundancy at each phase according to said projection data phase range determined, and

said parallel beam three-dimensional back projection means assigns said weighting factor generated (Sections IIA and IIB, Pages 874-877) to the projection data within said projection data phase range determined and performs three-dimensional back projection along said approximate trace to the back projection region (Page 874, Col. 1, lines 20-22).

With respect to claim 12, Bruder et al. further teaches said projection data phase range of π to 2π radians in the view direction (Page 876, Col. 1, lines 23-27) and

redundancy correction is performed using the weighting function by the redundancy correction weighting means (Sections IIA and IIB, Pages 874-877) .

With respect to claim 14, Bruder et al. further teaches in calculating said projection data phase range, projection data range is determined so that phase direction range of a beam back projected for each voxel is set to narrower than 2π (Page 876, Col. 1, lines 1-3).

10. Claim 13 is rejected, as best understood, under 35 U.S.C. 103(a) as being unpatentable over Flohr et al. in view of Silver, Bruder et al. and Tuy as applied to claim 10 above, and further in view of Noo et al.

With respect to claim 13, Flohr et al. as modified above suggests the apparatus as recited above. Flohr et al. fails to explicitly teach said projection data phase range is determined so that the beam having a narrowest cone angle, amongst the beams passing through said voxel, is selected.

Noo et al. teaches said projection data phase range is determined so that the beam having a narrowest cone angle, amongst the beams passing through said voxel, is selected (Page 564, lines 1-2 and Figure 3a).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the apparatus of Flohr et al. as modified above the determining of Noo et al., since a person would have been motivated to make such a modification to improve imaging by improving image quality (Page 567, lines 7-8) as implied by Noo et al.

11. Claims 1-4 are rejected, as best understood, under 35 U.S.C. 103(a) as being unpatentable over Taguchi (US 5,825,842) in view of Kudo et al. ("Three-Dimensional Helical-Scan Computed Tomography Using Cone-Beam Projections",1992, Systems and Computers in Japan, Volume 23, Number 12, Pages 75-82).

With respect to claim 1, Taguchi discloses an apparatus (Figure 1) comprising:

a radiation source (3) and a radiation detector (5) arranged opposite to each other (Figure 1), between which a bed (6) with an examinee placed thereon is provided (Col. 6, line 57), said radiation source and radiation detector turning around said bed which can be moved with respect

to this go-around axis, radiation irradiated from said radiation source and passing through the examinee being detected using said radiation detector (Col. 6, lines 55-63); and

reconfiguration means (12) for creating a three-dimensional tomographic image in a region in concern of the object from the detected projection data (Col. 7, lines 22-29), said reconfiguration means

determines, for each voxel, a projection data phase range (Col. 7, lines 22-25) as an optional angle of 180 degrees or more (Col. 2, line 15-17, Col. 14, line 20-24, Col. 15, lines 42-48 and Figures 12a and 12b),

assigns weights to data of the same phase or opposite phase for each phase for this projection data phase range (Col. 10, lines 5-31) and

three-dimension back projects this projection data over said projection data phase range determined for each voxel along the irradiation trace of the radiation beam (Col. 7, lines 12-29).

Taguchi fails to explicitly disclose superimposes a reconfiguration filter.

Kudo et al. teaches superimposes a reconfiguration filter (Equation 7).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Taguchi to include the filter of Kudo et al., since a person would have been motivated to make such a modification to improve imaging by filtering out high-frequencies (Page 78, Col. 2, lines 21-33) as taught by Kudo et al.

With respect to claim 2, Taguchi further discloses when determining said projection data phase range, a projection data phase range is determined so that the difference in the absolute

values of cone angles at both ends of the projection data phase range used is reduced (Col. 14, line 59 – Col. 15, line 47 and Figures 12a and 12b).

With respect to claim 3, Taguchi further discloses the projection data phase range used is determined so as to be the phase width for each voxel (Col. 2, lines 15-17, Col. 14, lines 19-24 and Col. 15, lines 42-48 and Figures 12a and 12b). However, Taguchi fails to disclose the same phase width for each voxel in this embodiment.

Taguchi further discloses the same phase width for each voxel (Col. 3, line 65 – Col. 4, line 5 and Figures 21a and 21b) in prior art.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the method of Taguchi as modified above the teachings of the same phase width for each voxel in the prior art disclosed by Taguchi, since the two forms are art recognized equivalents and the selection of any two of these known forms would have been within the level of ordinary skill in the art. A person would have been motivated to make such a modification to reduce processing time when streak artifacts are tolerable.

With respect to claim 4, Taguchi further discloses either 270 degrees or 360 degrees (Col. 2, lines 15-17, Col. 14, lines 19-24 and Col. 15, lines 42-48 and Figures 12a and 12b).

12. Claims 10-14 are rejected, as best understood, under 35 U.S.C. 103(a) as being unpatentable over Taguchi in view of Proksa et al. ("The n-PI-Method for Helical Cone-Bean

CT", September 2000, IEEE Transactions on Medical Imaging, Volume 19, Number 9, Pages 848, 863).

With respect to claim 10, Taguchi discloses an apparatus (Figure 1) comprising:

a radiation source (3) and a radiation detector (5) made up of two-dimensionally arranged detection elements (Col.5, lines 48-49), arranged opposite to each other (Figure 1), between which a bed (6) with an examinee placed thereon is provided (Col. 6, line 57), said radiation source and radiation detector turning around said bed which can be moved with respect to this go-around axis, radiation irradiated from said radiation source and passing through said examinee being detected using said radiation detector (Col. 6, lines 55-63); and

reconfiguration means (12) for creating a three-dimensional tomographic image in said region in concern of the examinee from the detected projection data (Col. 7, lines 22-29), wherein said reconfiguration means

determines, for each voxel, a projection data phase range (Col. 7, lines 22-25) as an optional angle of 180 degrees or more (Col. 2, line 15-17, Col. 14, line 20-24, Col. 15, lines 42-48 and Figures 12a and 12b),

corrects each row of the projection data by multiplying a coefficient which is dependent on the angle of inclination of radiation from said radiation source (Col. 2, lines 5-7),

three-dimension back projects the beam projection data subjected to said projection data phase range determined for each voxel to the back projection region corresponding to said region in concern along the irradiation trace (Col. 7, lines 12-29).

Taguchi fails to explicitly disclose carries out one-dimensional rearrangement processing for obtaining parallel beam projection data from the fan beam projection data obtained from a fan-shaped fan beam viewed from the go-around axis direction generated from said radiation source.

Taguchi further fails to disclose calculates an approximate straight line for a curve obtained by projecting a spiral trace of an X-ray source with respect to said examinee onto a plane parallel to said go around axis, and

superimposes said reconfiguration filter on said parallel projection data to generate filter-processed parallel projection data.

Proksa et al. teaches calculates an approximate straight line for a curve obtained by projecting a spiral trace of an X-ray source with respect to said examinee onto a plane parallel to said go around axis (Figure 7 and Pages 861, Appendix I, Section B, i.e. spiral trace of consecutive turns of source on detector becomes top and bottom halves of rectangle of virtual detector),

carries out one-dimensional rearrangement processing for obtaining parallel beam projection data from the fan beam projection data obtained from a fan-shaped fan beam viewed from the go-around axis direction generated from said radiation source (Figure 7), and

superimposes said reconfiguration filter on said parallel projection data to generate filter-processed parallel projection data (Page 853, Col. 1, line 21).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Taguchi to include the filtering of Proksa et al., since a

person would have been motivated to make such a modification to improve imaging by filtering out high-frequency noise.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the apparatus of Taguchi as modified above the parallel rebinning of Proksa et al., since a person would have been motivated to make such a modification to improve computational speeds while simplifying the filtering operation.

With respect to claim 11, Taguchi further discloses said reconfiguration means performs redundancy correction weighting for generating a weighting factor from a weighting function in the phase direction to correct data redundancy at each phase according to said projection data phase range determined (Col. 10, lines 5-31 and Col. 14, line 59 – Col. 15, line 56), and

said parallel beam three-dimensional back projection means assigns said weighting factor generated to the projection data within said projection data phase range determined (Equations 5-8) and performs three-dimensional back projection along said approximate trace to the back projection region (Col. 7, lines 12-29).

With respect to claim 12, Taguchi further discloses said projection data phase range of π to 2π radians is determined in the view direction (Col. 2, line 15-17, Col. 14, line 20-24, Col. 15, lines 42-48 and Figures 12a and 12b) and redundancy correction is performed using the weighting function by the redundancy correction weighting means (Col. 10, lines 5-31 and Col. 14, line 59 – Col. 15, line 56).

With respect to claim 13, Taguchi further discloses said projection data phase range is determined so that the beam having a narrowest cone angle, amongst the beams passing through said voxel, is selected (Col. 3, lines 50-60, Col. 14, line 59 – Col. 15, line 47 and Figures 12a and 12b).

With respect to claim 14, Taguchi further discloses in calculating said projection data phase range, a projection data range is determined so that a phase range of a beam back projected for each voxel is set to narrower than 2π (Col. 2, lines 15-17).

Response to Arguments

13. Applicant's arguments with respect to claims 1-14 have been considered but are moot in view of the new ground(s) of rejection.

14. Applicant's arguments filed 5 November 2007 have been fully considered but they are not persuasive.

With respect to the 35 USC 112 second paragraph rejection of at least claims 5, 6 and 7, the Applicant directed the Examiner's attention to paragraph [0129] of the Patent Publication "wherein it is pointed out that a display pixel need not be rectangular, but can be hexagonal, and a number of projection phases corresponds to a number of sides in a polygonal display pixel", thus arguing that the claims are definite. The Examiner disagrees. Pixels are displayed on a device such as the display device 5 in Figure 1. The section cited by the Applicant appears to

suggest that the data collected and backprojected by the apparatus is dependent upon the particular pixel presentation properties of display 5. It does not seem reasonable that an x-ray tomography apparatus would be constructed and programmed in such a way that it would require reconfiguring and reprogramming of the backprojection steps to accommodate an upgraded computer display with different pixel presentation properties. The cited section does not appear to be directly connected to the use of display 5. The lack of clarity as to what is being claimed may be a result of a confusing or literal translation of the foreign priority document upon which the present application is based. The cited section therefore does not render the claims definite. Therefore, the Applicant's arguments are not persuasive and the 35 USC 112 second paragraph rejection of at least claim 5, 6 and 7 remains.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Proksa et al. (US 6,285,733) discloses parallel rebinning on a flat, rectangular virtual detector, which significantly simplifies the subsequent one-dimensional filtering operation (Col. 2, lines 33-36 and Figures 3-5).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN M. CORBETT whose telephone number is (571)272-8284. The examiner can normally be reached on M-F 8 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward J. Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. M. C./
Examiner, Art Unit 2882

/Chih-Cheng Glen Kao/
Primary Examiner, Art Unit 2882